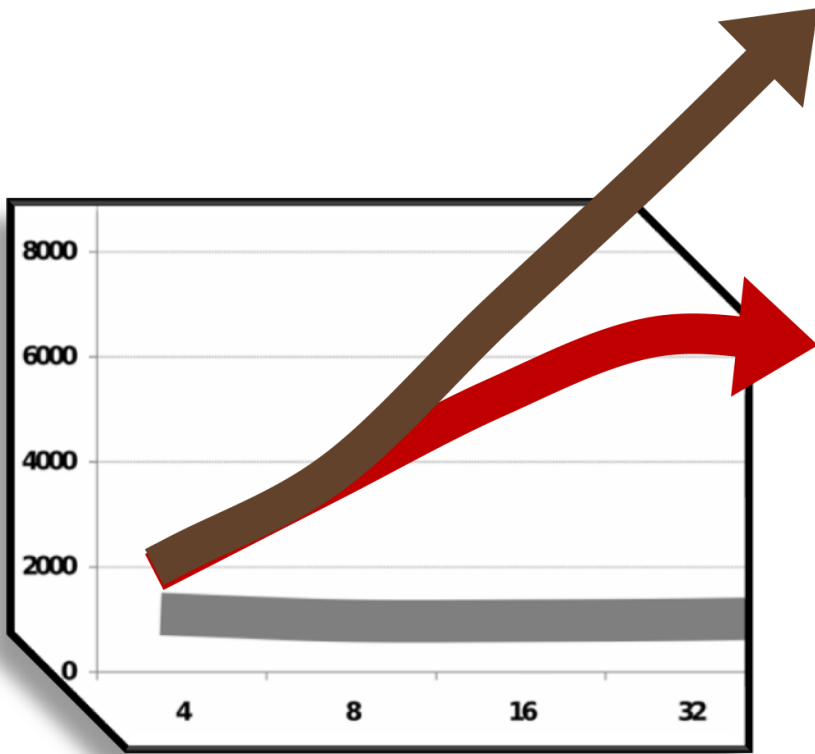




On Predictive Modeling for **Distributed Databases**

@andy_pavlo

VLDB - August 28th, 2012



Databases?



Evan Jones?

**Putin is going to
get re-elected!**



**Romney has a Swiss
bank account!**



**Muammar Gaddafi
is in trouble!**





High-Volume Transaction Processing



-Store

Main Memory • Parallel • Shared-Nothing

H-Store: A High-Performance, Distributed
Main Memory Transaction Processing System
Proc. VLDB Endow., vol. 1, iss. 2, pp. 1496-1499, 2008.





Fast

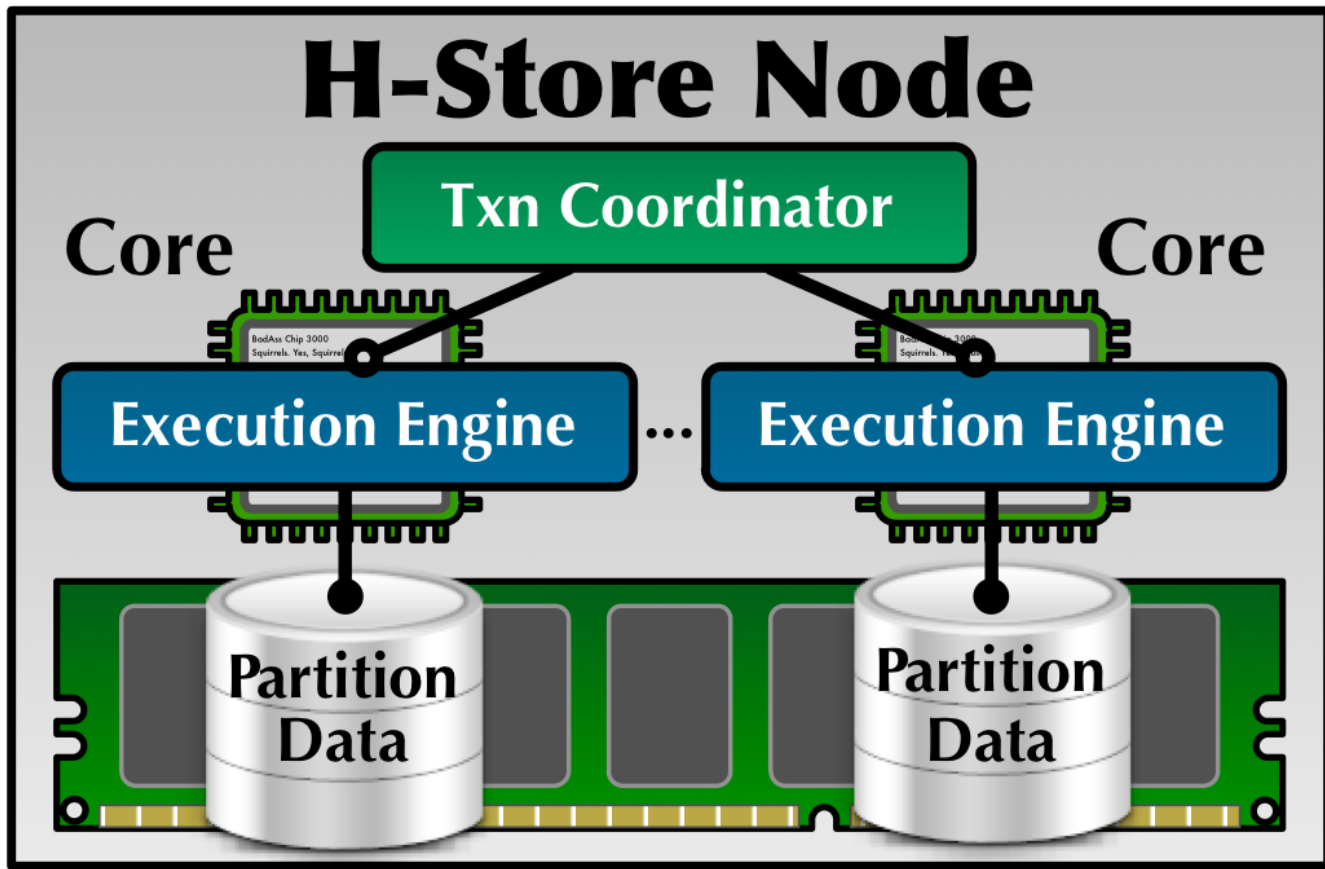


Repetitive

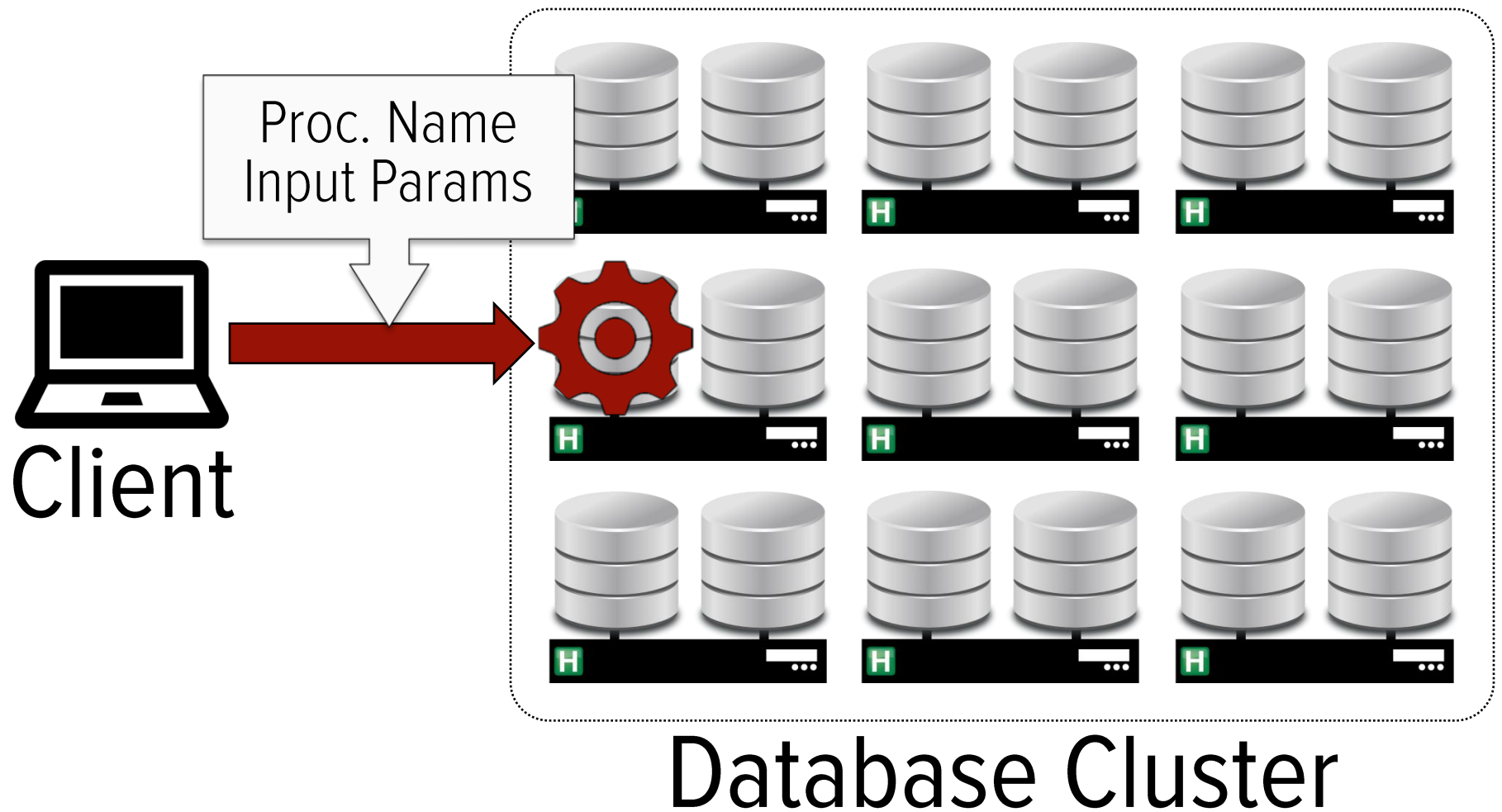


Small

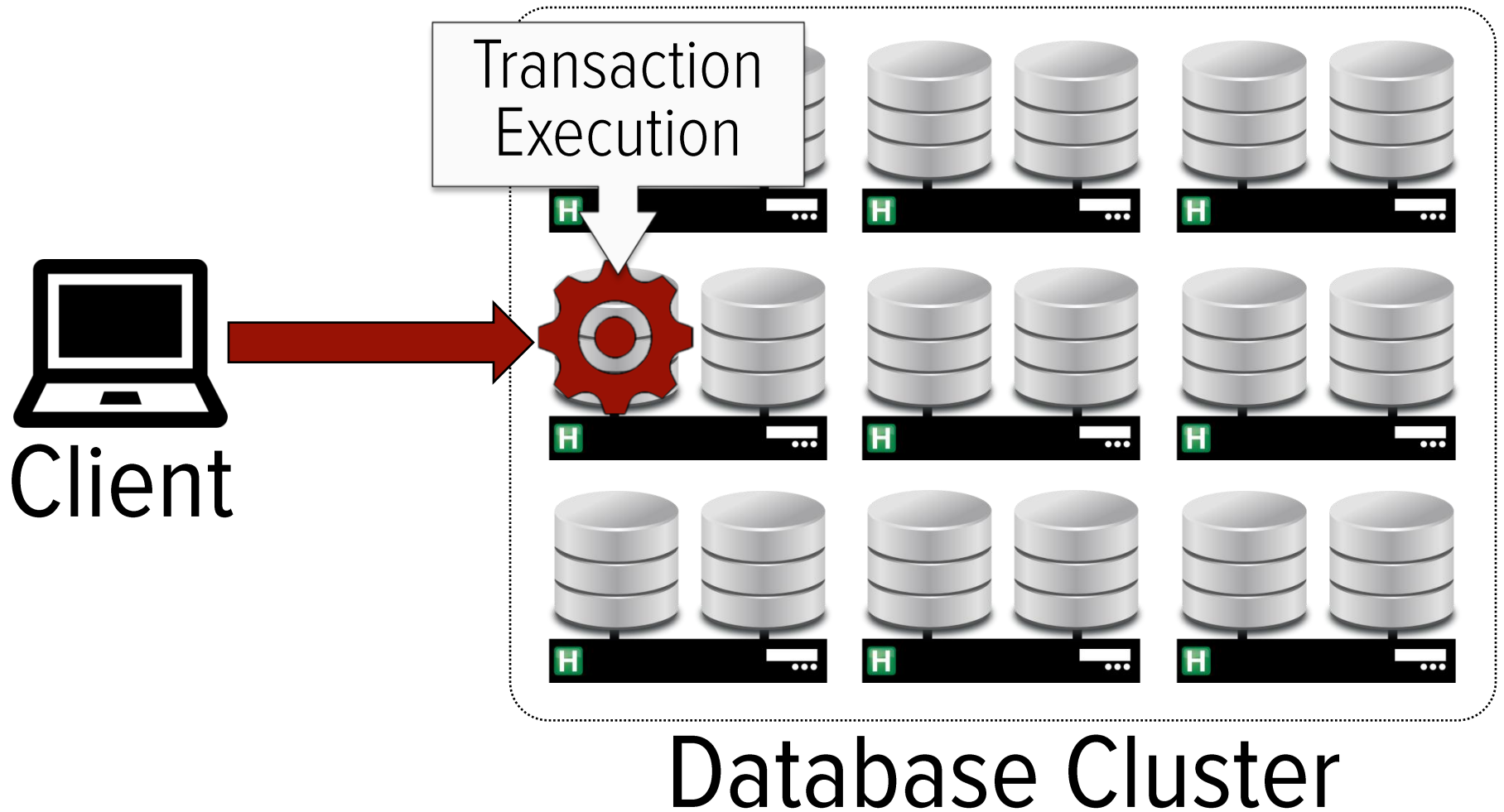
H-Store



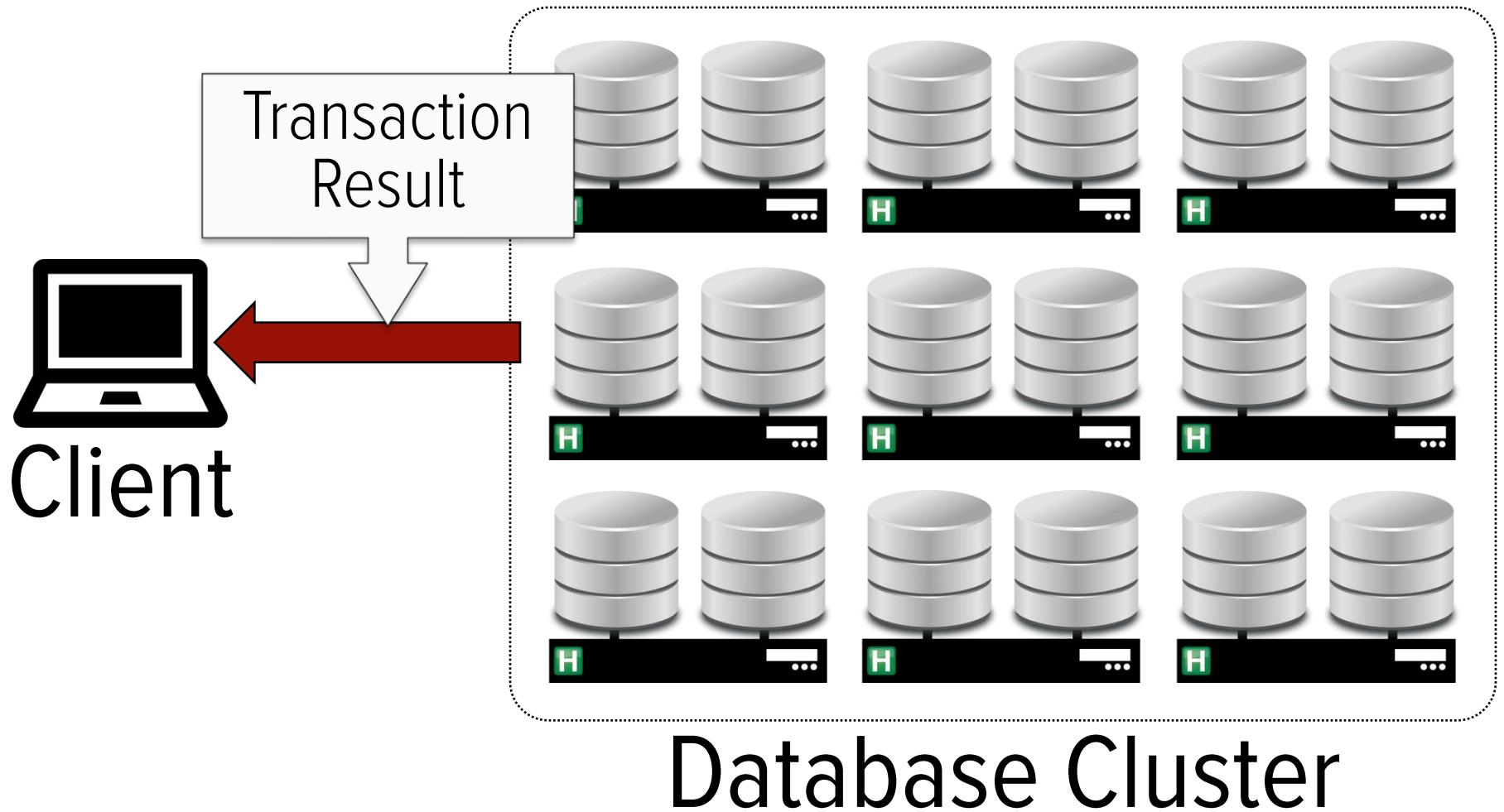
H-Store



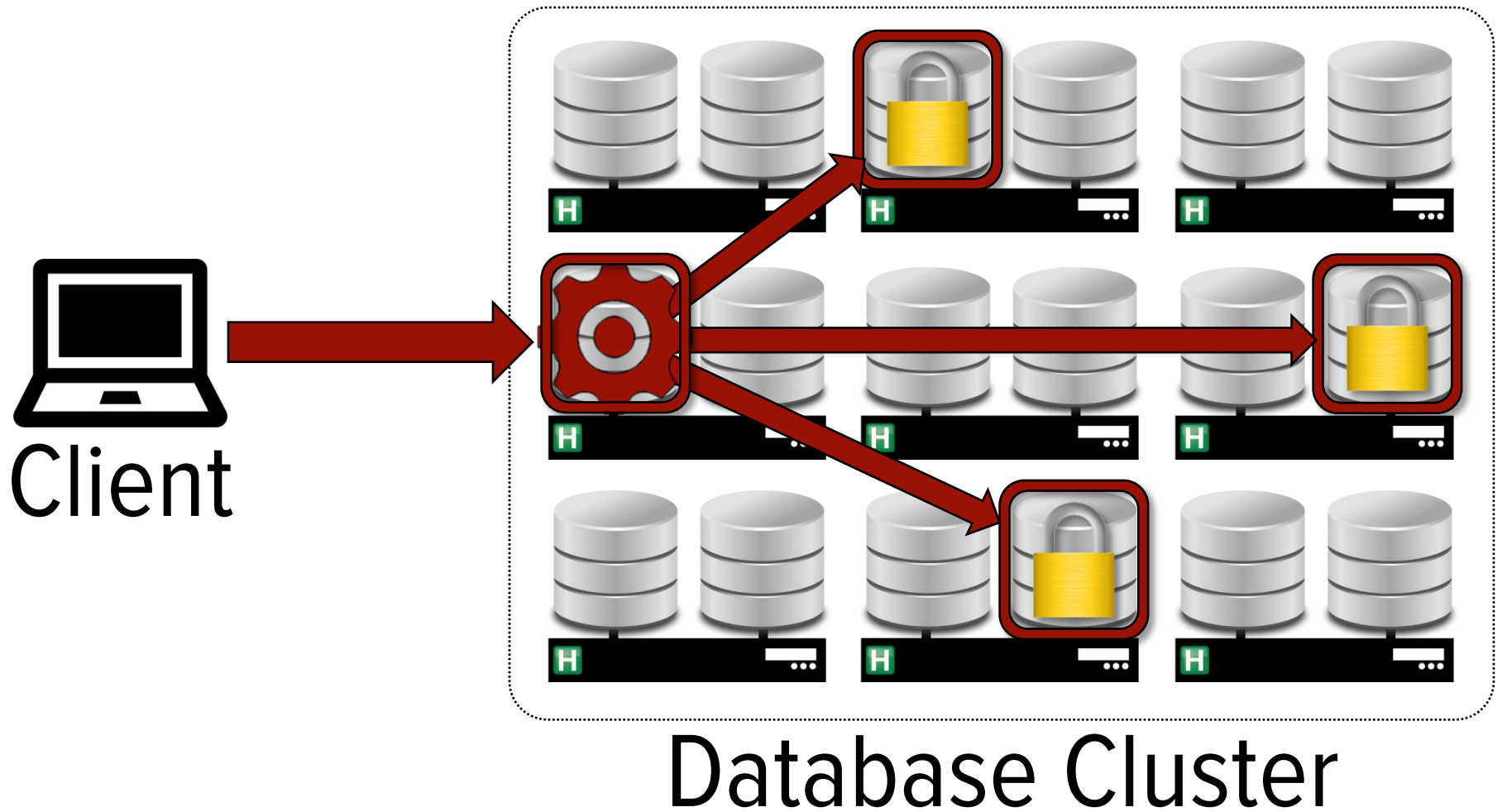
H-Store



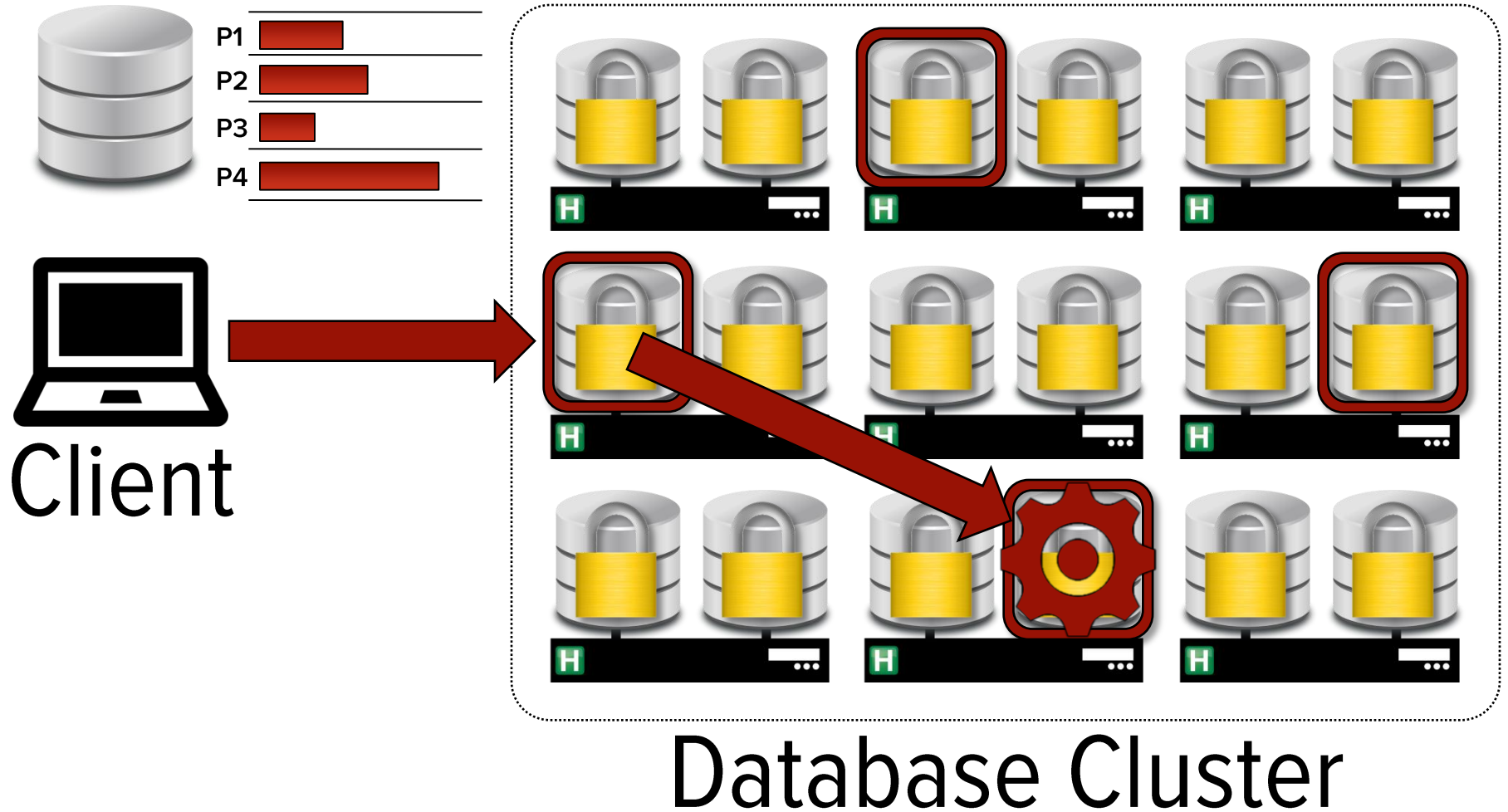
H-Store



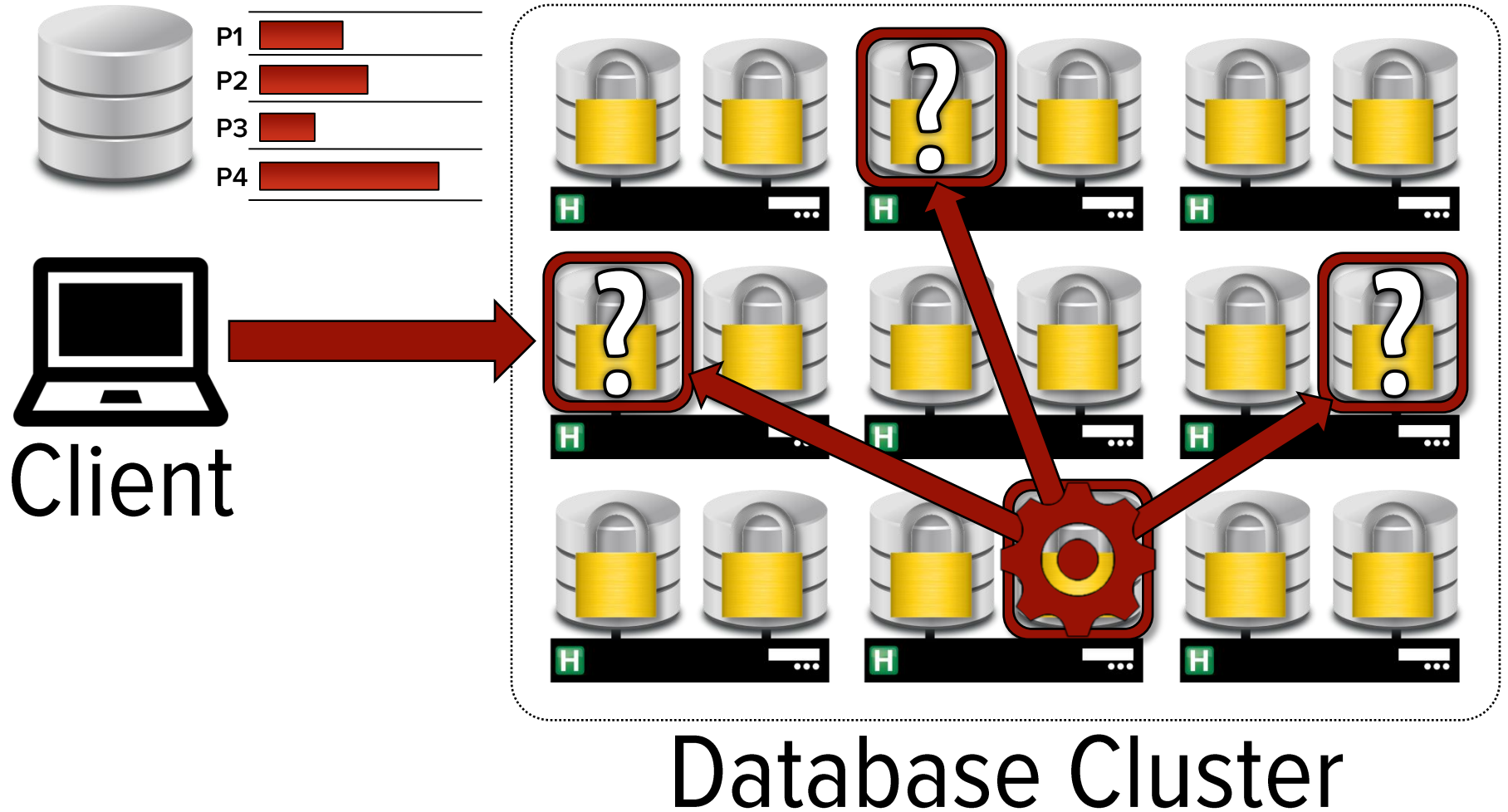
H-Store



H-Store



H-Store



A man with reddish-brown hair and glasses is shown in profile, facing right. He is wearing a dark blue jacket over a striped shirt and has a backpack on. A speech bubble originates from his mouth, containing text about database transactions. The background is a solid red color.

**This transaction will
execute 4 queries on
partitions 1,3, and 6!**



Pro Tip:

Canadians do not
like unnecessary
surgeries.

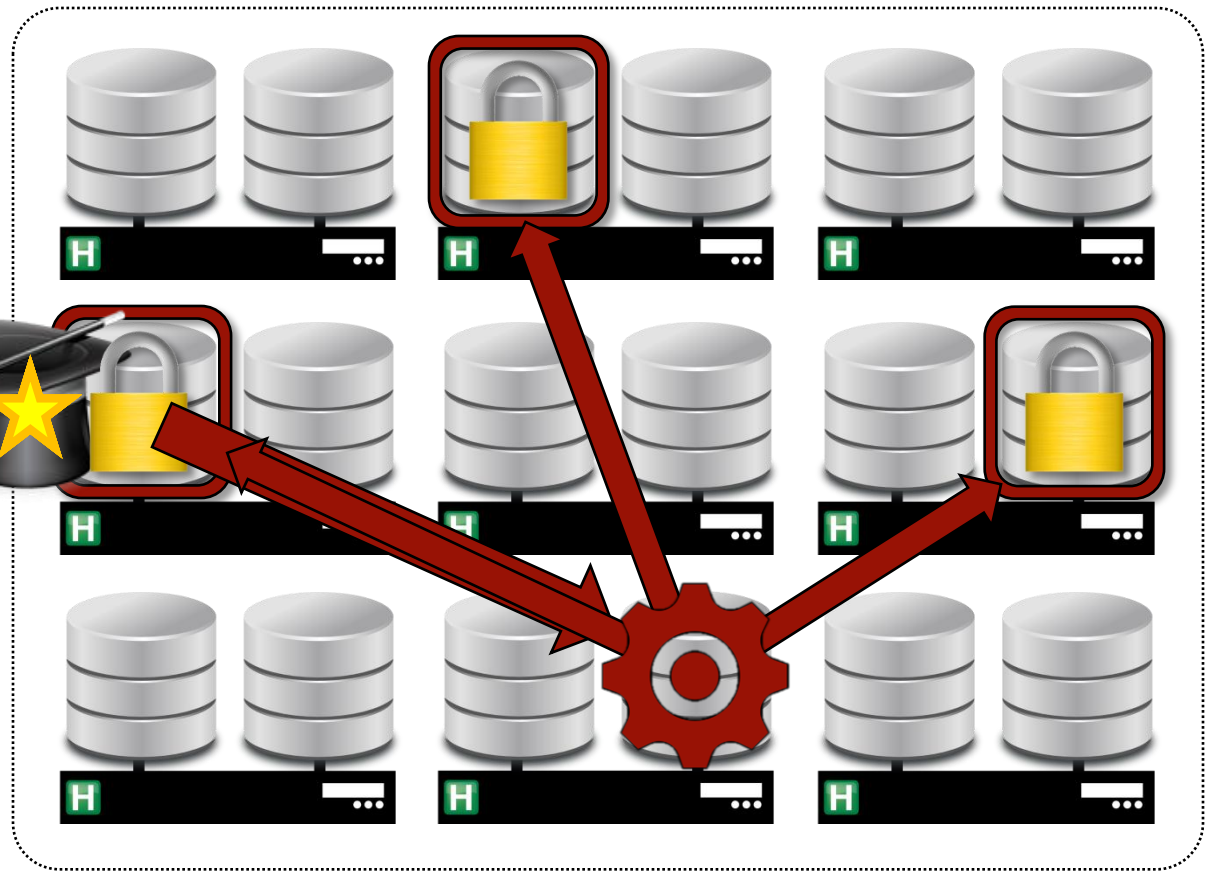
Main Idea:

Use models to predict
transaction behavior
before execution.

On Predictive Modeling for Optimizing
Transaction Execution in Parallel OLTP Systems
Proc. VLDB Endow., vol. 5, iss. 2, pp. 85-96, 2011.

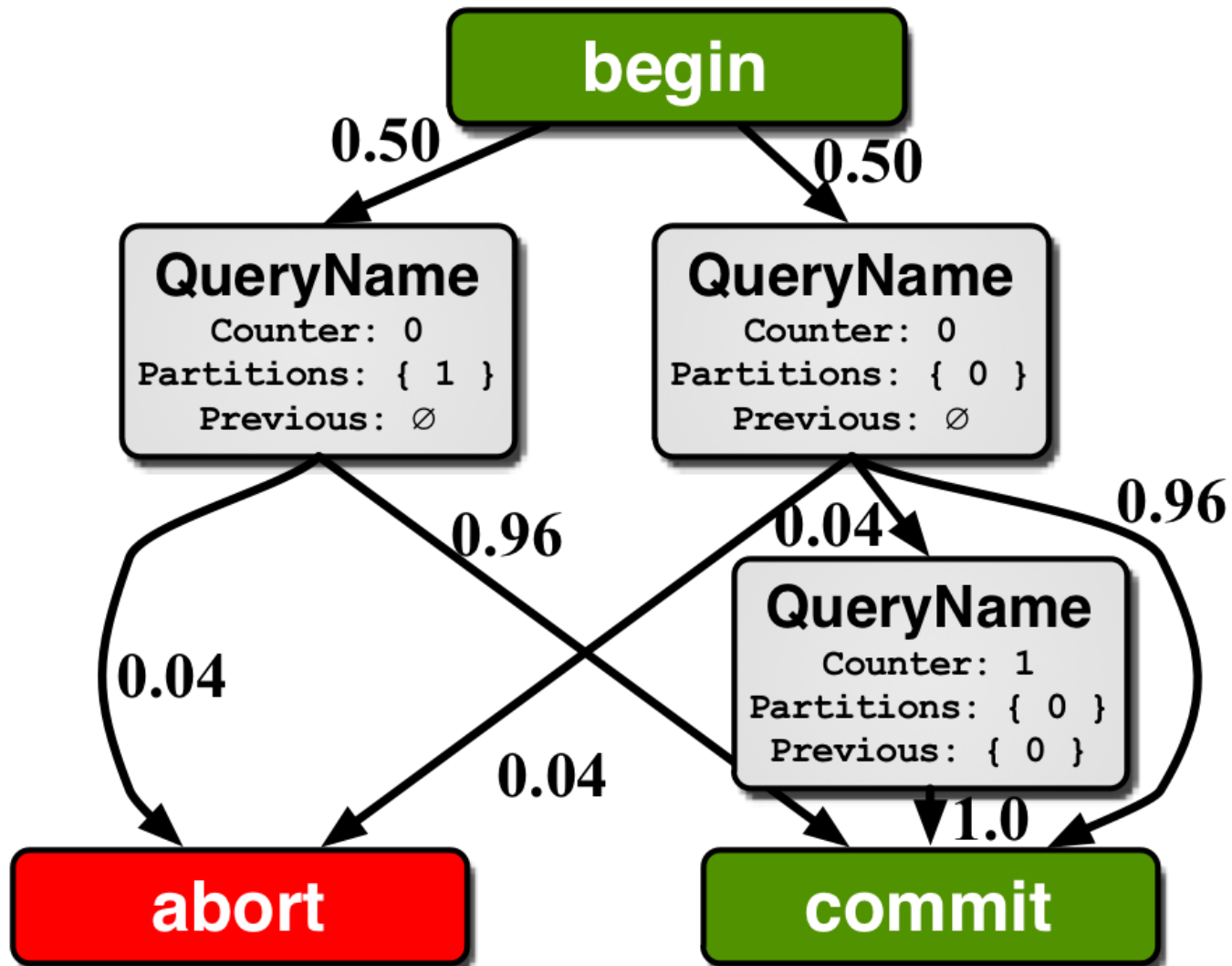


Houdini[®]



Database Cluster

Houdini

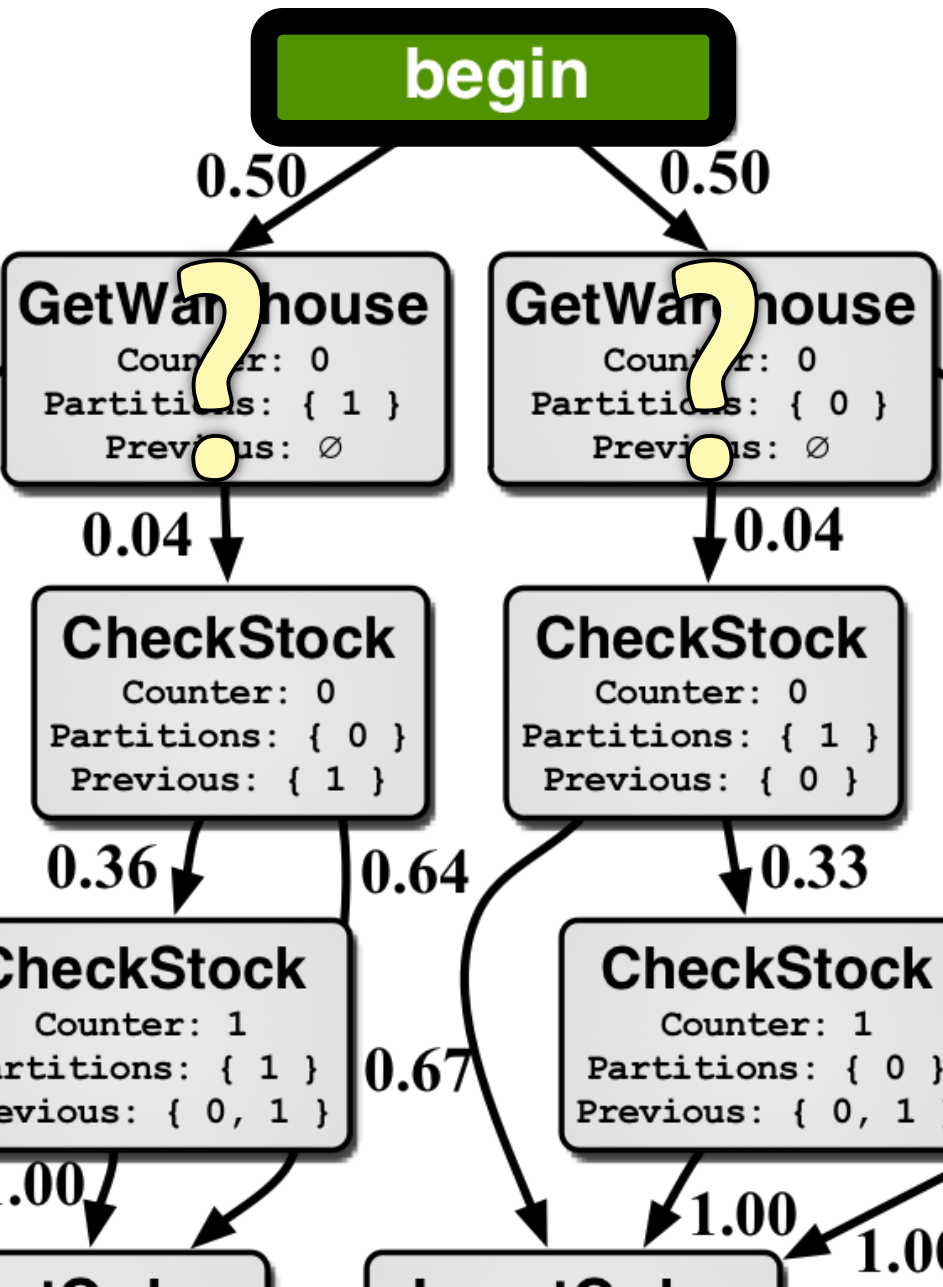


Step #1:

Estimate the path
that the transaction
will take.

Current State

begin



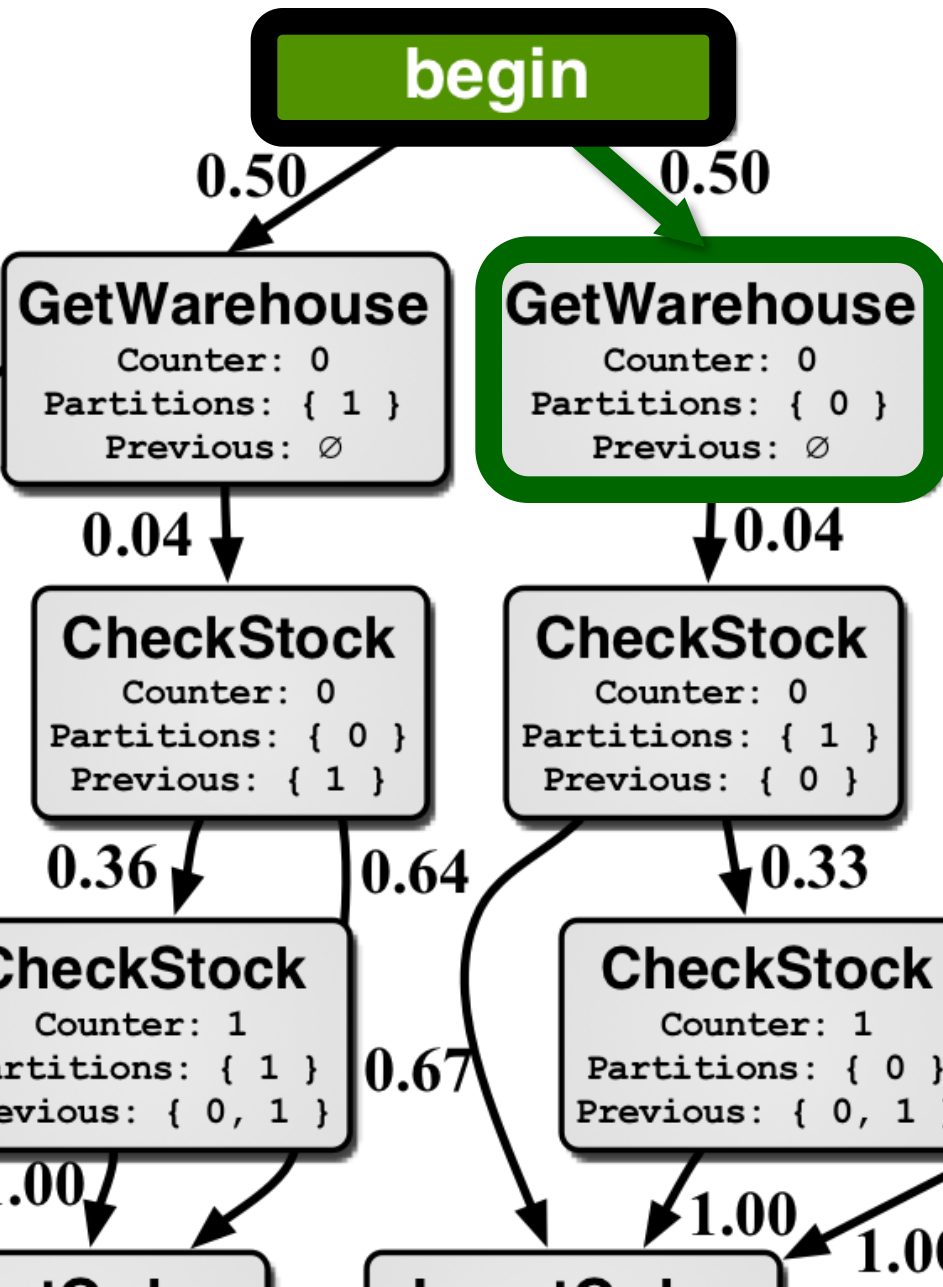
Input Parameters:

```
w_id=0  
i_w_ids=[0,0]  
i_ids=[1001,1002]
```

GetWarehouse:

```
SELECT * FROM WAREHOUSE  
WHERE W_ID = ?
```

Current State



Input Parameters:

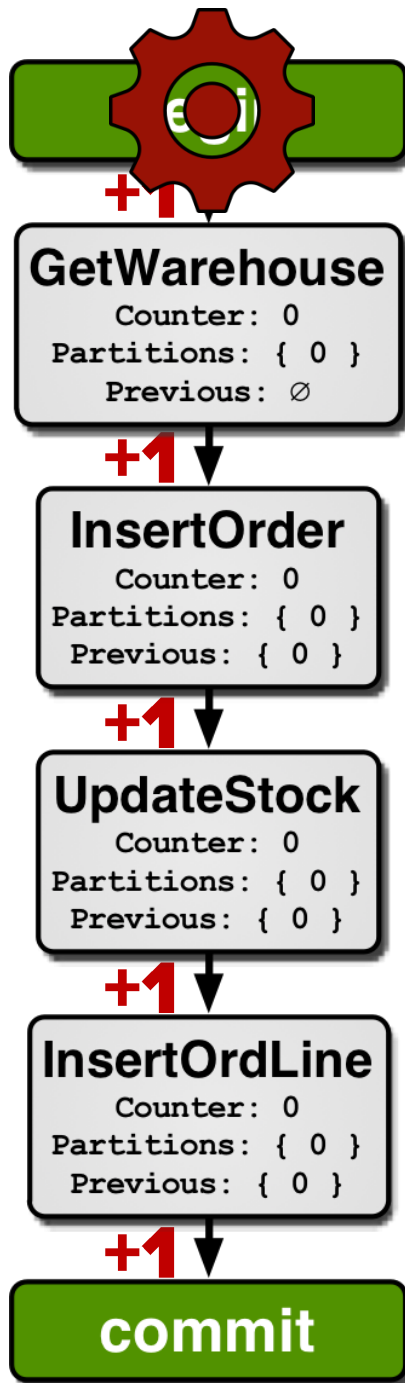
```
w_id=0  
i_w_ids=[0,0]  
i_ids=[1001,1002]
```

GetWarehouse:

```
SELECT * FROM WAREHOUSE  
WHERE W_ID = ?
```

Step #2:

Determine which
optimizations to
enable in the DBMS.

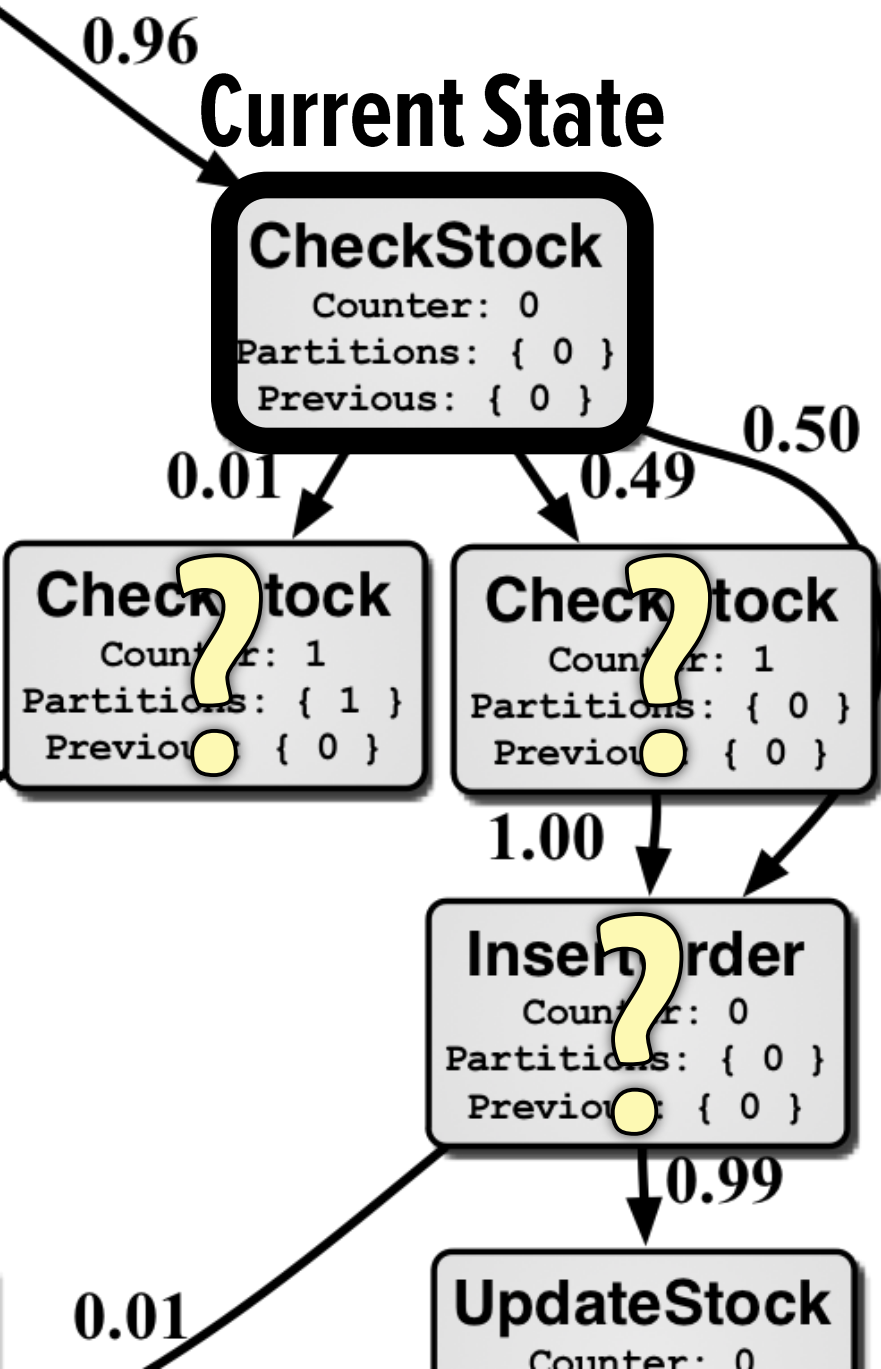


Input Parameters:

```
w_id=0  
i_w_ids=[0,0]  
i_ids=[1001,1002]
```

Optimizations:

- **Best Partition?**
- **Touched Partitions?**
- **Finished Partitions?**



Input Parameters:

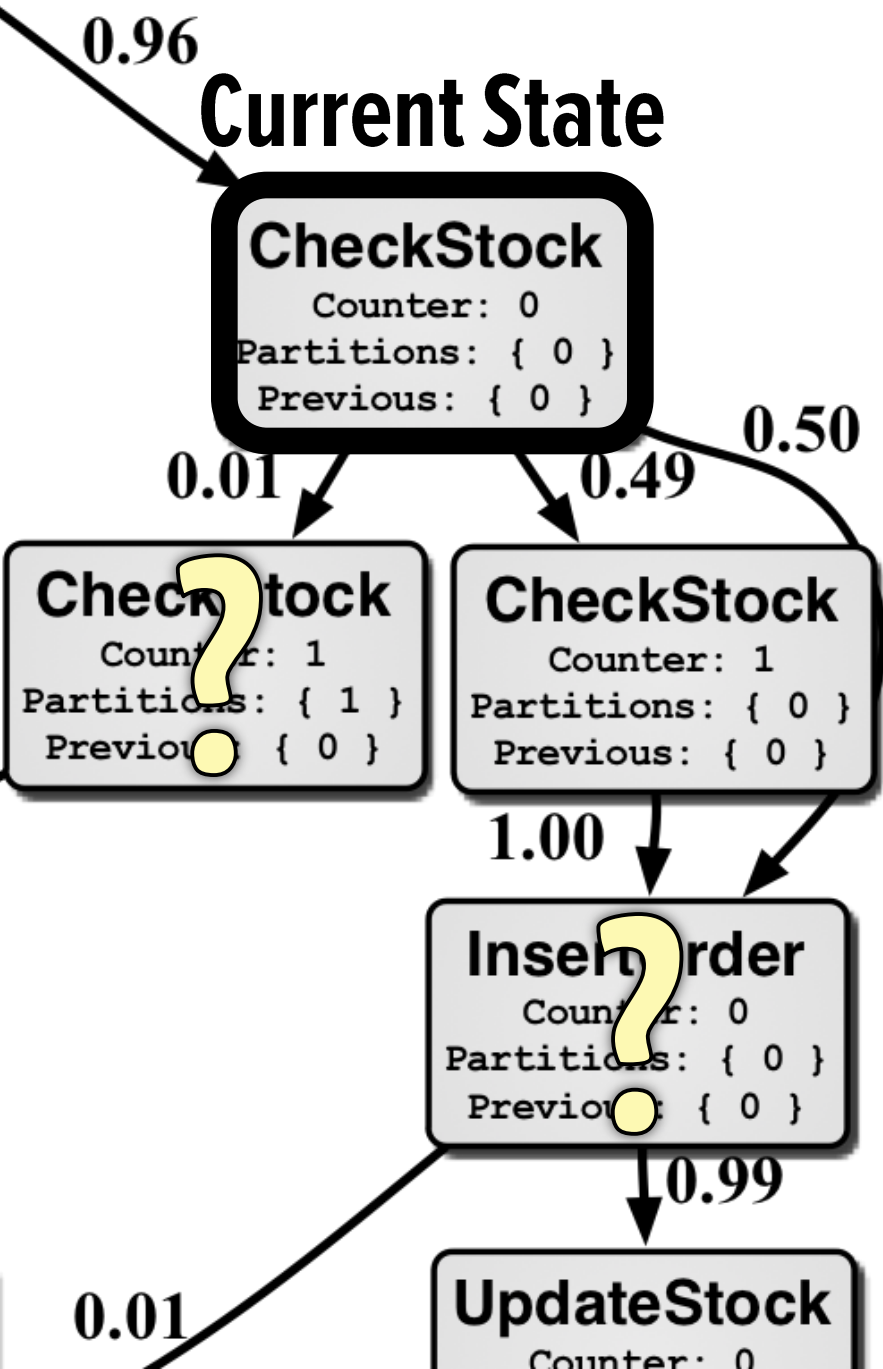
```
w_id=0  
i_w_ids=[0,1]  
i_ids=[1001,1002]
```

CheckStock:

```
SELECT S_QTY FROM STOCK  
WHERE S_W_ID = ?  
AND S_I_ID = ?;
```

InsertOrder:

```
INSERT INTO ORDERS  
(o_id, o_w_id)  
VALUES (?, ?);
```

Input Parameters:

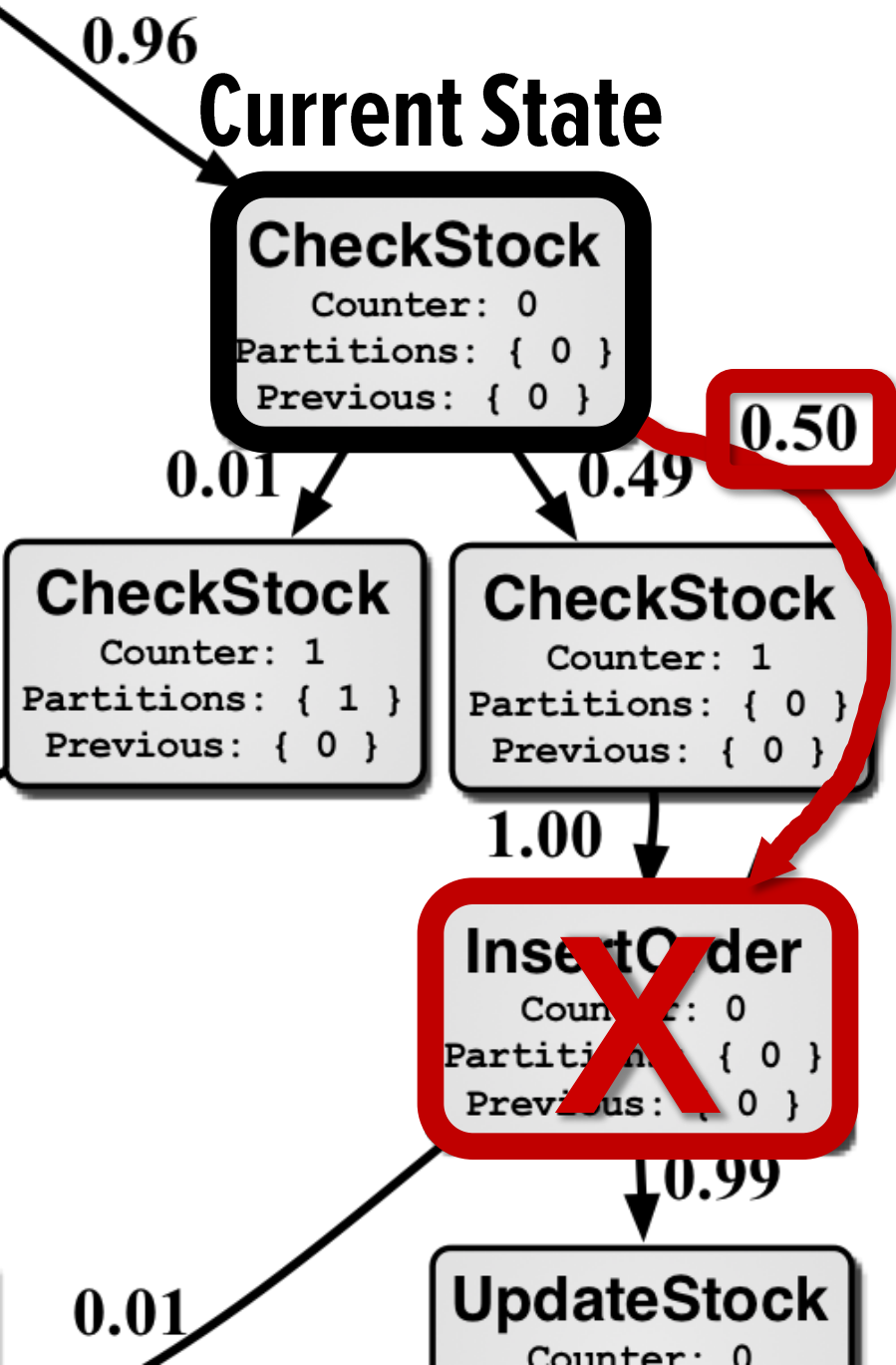
```
w_id=0
i_w_ids=[0 1]
i_ids=[1001,1002]
```

CheckStock:

```
SELECT S_QTY FROM STOCK
WHERE S_W_ID = ?
AND S_I_ID = ?;
```

InsertOrder

```
INSERT INTO ORDERS
(o_id, o_w_id)
VALUES (?, ?);
```



Input Parameters:

```
w_id=0  
i_w_ids=[0 1]  
i_ids=[1001,1002]
```

CheckStock:

```
SELECT S_QTY FROM STOCK  
WHERE S_W_ID = ?  
AND S_I_ID = ?;
```

InsertOrder

```
INSERT INTO ORDERS  
(o_id, o_w_id)  
VALUES (?, ?);
```

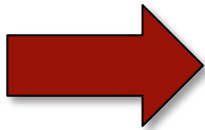
THE GIFTS OF MISS CLEO



Special Guest: Evan

GET A FREE 7 MINUTE TAROT READING

**SUNDAY,
SEPTEMBER 16
9PM ET
ON iN DEMAND
PAY-PER-VIEW**



w_id=0

i_w_ids=[0,1]

i_ids=[1001,1002]

HashValue(w_id)

=0

=1

ArrayLength(i_w_ids)

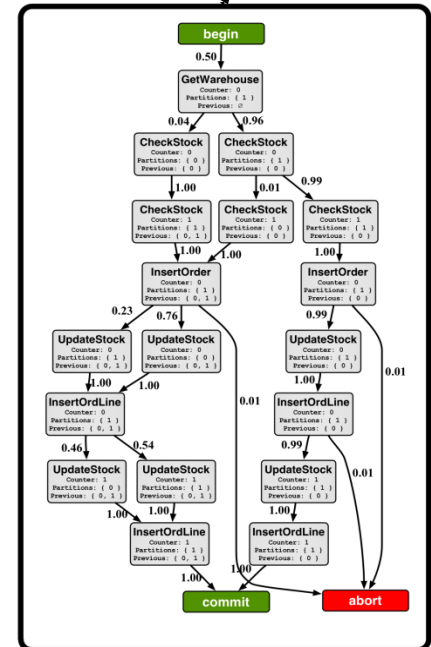
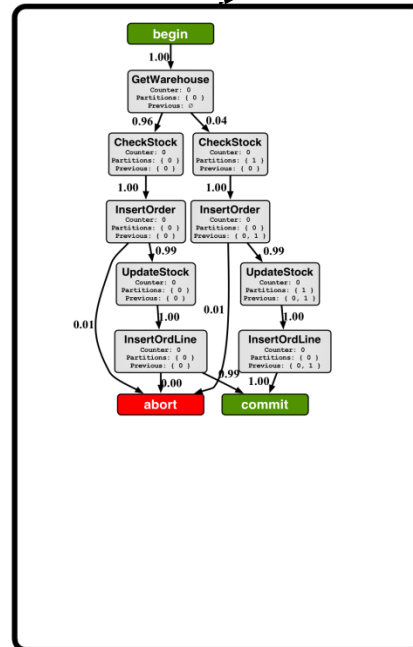
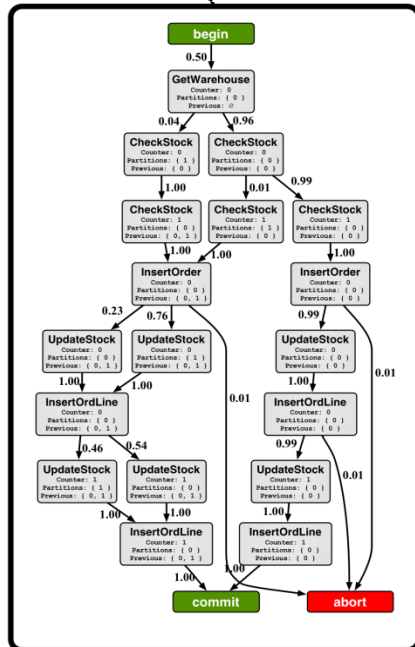
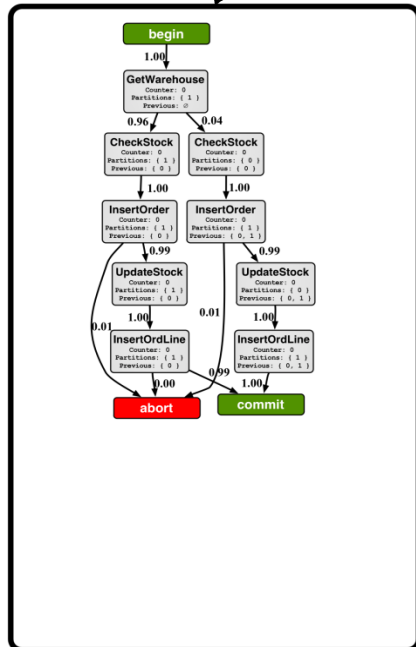
ArrayLength(i_w_ids)

=1

=2

=1

=2



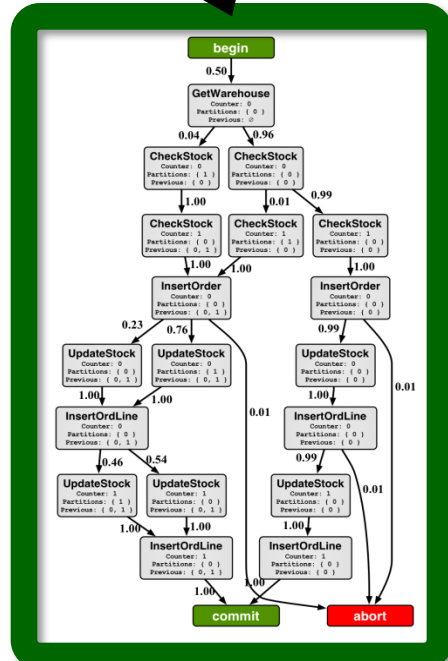
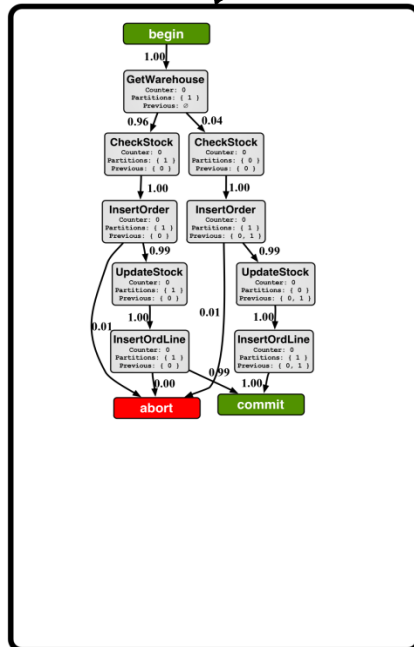

```
i ids=[1001,1002]
```

$$= 0$$

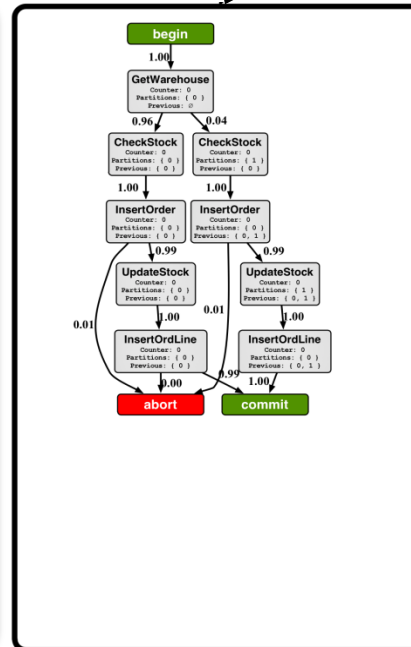
=1

=1

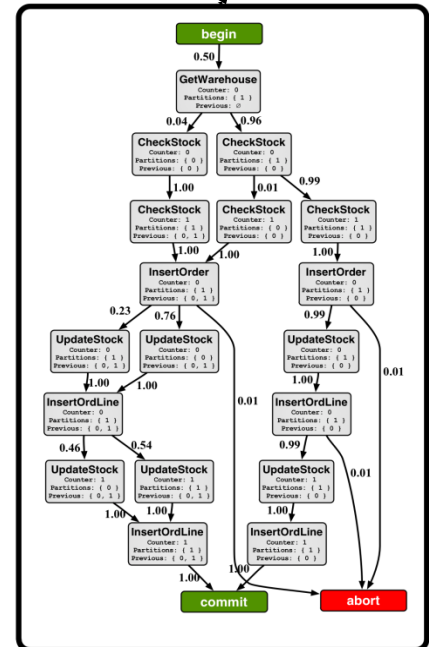
=2



=1



=2



Experimental Evaluation

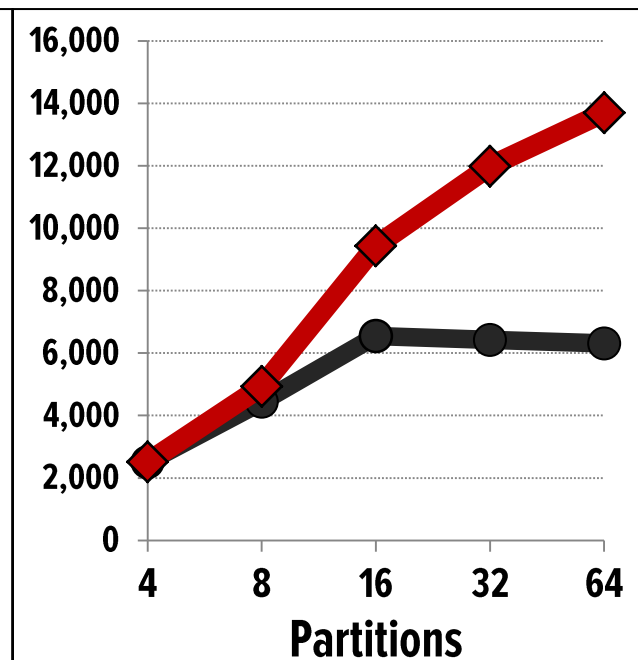
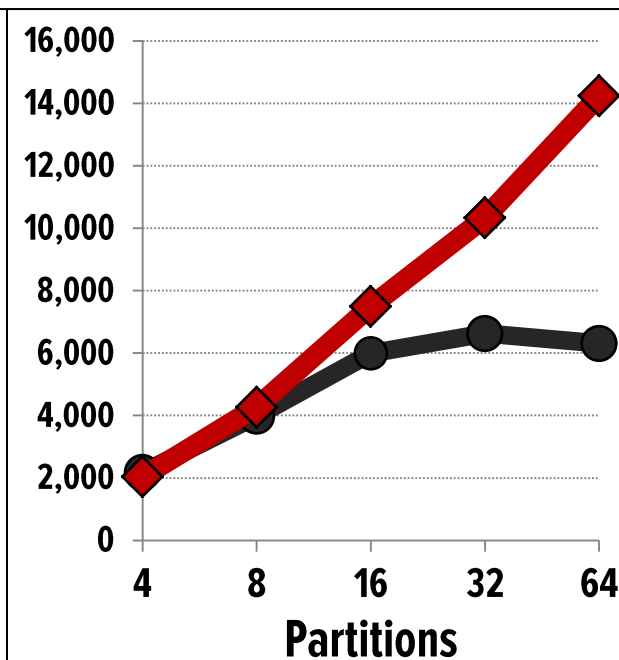
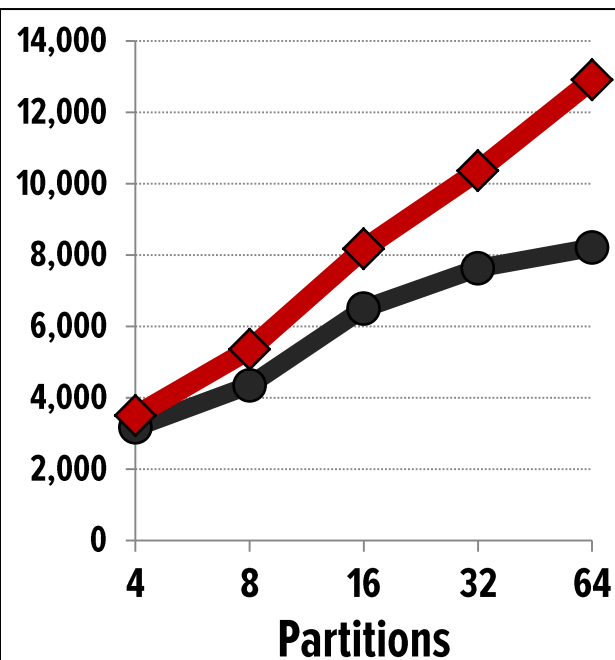
Accuracy Overhead

TATP	94.9%	+1.86%
-------------	-------	--------

TPC-C	95.0%	+1.17%
--------------	-------	--------

AuctionM	90.2%	+8.15%
-----------------	-------	--------

(txn/s) **Houdini** **Assume Single-Partitioned**



TATP
+57%

TPC-C
+126%

AuctionM
+117%

Conclusion:

Scaling your OLTP
DBMS must come
from within.



-Store

H-Store

Next Generation OLTP Database Research

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H-Store is an experimental main-memory, parallel database management system that is optimized for OLTP applications. It is a highly distributed, row-store-based relational database that runs on a cluster on shared-nothing, main memory executor nodes.

The H-Store project is a collaboration between [MIT](#), [Brown University](#), [Yale University](#), and HP Labs.



New Release (March 2012)

March 16th, 2012 at 9:36 pm

The H-Store project is releasing the latest version of its experimental OLTP database management system. This version contains a large number of speed and stability improvements. The next release will contain mostly new features.

Major highlights of this release:

1. Significant speed optimizations for single-partition transactions. [[c67b64a](#)] [[c67b64d](#)] [[026596d](#)] [[0425253](#)] [[243f99d](#)] [[5abd178](#)]
2. Fixed several memory leaks for aborted/read-only transactions. [[a6d72f2](#)] [[a629921](#)]
3. Fixed several stability issues when transactions share lock-free data structures. [[5956be9](#)]
4. Fixed predicate/aggregate pushdowns for distributed query plans. [[4956be9](#)] [[21e0f6d](#)]
5. Restored the ability for transactions to return the proper status codes on failures that mimic VoltDB's protocol. [[a6d68e4](#)] [[0774e49](#)]
6. H-Store's [Fabric](#) automatic deployment script for EC2 now supports multiple concurrent "virtual" clusters. This allows you to easily assign instances to independent clusters under a single AWS account. [[1502966](#)]
7. Restored preliminary support for VoltDB's regression test suite. [[154f665](#)] [[c434fa2](#)] [[1945aba9](#)]
8. Fixed building on OS X Lion [[0328973](#)]

The source code for this release can be downloaded via GitHub:

<https://github.com/apavlo/h-store/tarball/release-2012-03>

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github

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H-Store Parallel Main-Memory OLTP Database System — [Read more](#)

<http://hstore.cs.brown.edu>

[ZIP](#) [HTTP](#) [Git Read-Only](#) <https://github.com/apavlo/h-store.git> [Read-Only access](#)

branch: master Files Commits Branches Tags Downloads

Latest commit to the master branch

Added some comments and TODOs for Alex to work deferrable stuff

apavlo authored 10 hours ago

h-store /

name	age	message	history
properties	3 months ago	Cleaned up callback mechanisms in BenchmarkComponent. Switched TPC-C ... [apavlo]	
scripts	21 days ago	Updated TPC-C mappings. Fixed BaseTestCase so that it uses the Abstra... [apavlo]	
src	10 hours ago	Added some comments and TODOs for Alex to work deferrable stuff [apavlo]	
tests	11 hours ago	Added new 'deferrable' commandline argument for 'hstore-prepare' to m... [apavlo]	
third_party	11 days ago	Merged from master [apavlo]	
tools	11 days ago	Merged from master [apavlo]	
classpath	2 months ago	Minor tweaks and importing CompressionService code from VoltDB to H-S... [apavlo]	
gitignore	3 months ago	Updated HStoreConfigUtil to dump out HTML files to update the website w... [apavlo]	
gitmodules	4 months ago	Set up hstore-files submodule [c1ee749]	
project	2 months ago	Added filters to hide unneeded files in the root directory in Eclipse [apavlo]	
COPYING	2 years ago	Repository overhaul. Moved all of src into trunk [apavlo]	

<http://hstore.cs.brown.edu>

<https://github.com/apavlo/h-store>

Police arrest Canadian man charged in psychic scam

Posted by Jessica Bartlett April 17, 2012 10:24 AM

[Print](#) | [Comments \(1\)](#)



By Jessica Bartlett, Town Correspondent

Police have arrested **Evan P.C. Jones**, a non-French speaking Canadian man who allegedly used psychic reading sessions to scam a Pembroke woman out of thousands of dollars.

According to police, the 69-year-old victim had made several visits in early April to a “psychic and card reading” business at 49 Whiting St. in Hingham.

During those visits, the Canadian man elicited

information about the victim and her family members. On the last visit, Evan told the victim that there was a “curse and a black cloud” over her, and in order to life it, she would need to pay \$16,000.

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